Please substitute the attached clean copy of the twice amended claim 1 for the pending claim 1. A marked-up version of the claim with all the changes shown is attached also.

REMARKS

Claims 1 and 8 through 11 are in the application; claims 2 through 7 are canceled.

Reconsideration and withdrawal of the rejection of claims 1 and 6-11 under 35 U.S.C. 103(a) as being unpatentable over Hohenbichler et al. (US 5,577,548) in view of Mörwald et al. (US 6,209,619) is respectfully requested.

Claim 1 has been amended by incorporating therein the subject matter of claims 6 and 7.

Claim 1 now defines the steps of:

- calculating the adjusting speed, based on the current casting speed, the segment length, and the required adjusting stroke of the segments, according to

$$V = Ds/Ls * Vcast$$

wherein Ds is the section change, Ls is the segment length, and Vcast is the current casting speed; and

- wherein the adjusting steps are carried out by hydraulic adjusting devices;

monitoring the adjusting steps via current cylinder pressure of the hydraulic adjusting devices, comprising the step of applying force control instead of position control when a predetermined force threshold value is surpassed and the step of applying position control again when the target position has been reached.

The invention is thus defined by a particular way of calculating the **adjusting speed** based on the section change, the segment length, and the current casting speed. Applicant respectfully disagrees with the examiner's holding of obviousness of the equation defined in claim 1 (former claim 6). The cited prior art reference to Hohenbichler deals **exclusively** with positioning of the segments in order to control and monitor the gap formed between the rollers 8. The disclosure in regard to the computer control (col. 6, lines 55-65) teaches only that a predetermined program can be used in order to adapt the gap to the existing conditions and the only parameter mentioned for the **control of the gap** is the casting speed and in the paragraph

starting in col. 6, line 66, the position of the tip 19 of the liquid core.

A specific adjusting speed (the speed at which the segments are adjusted) is never mentioned in Hohenbichler. The obvious choice would be to adjust the segments as quicky as possible in order to be within the desired limits again. To take into consideration the parameters section change, segment length, and current casting speed for calculating the adjusting speed is not an obvious step in view of the prior art, in particular, since Hohenbichler never mentions the adjusting speed or that it should be varied under certain conditions. The only text portion dealing with the adjustment and the speed at which it is performed can be found in col. 6, lines 59-62:

"In this way, the thickness of the gap formed by the opposite rollers 8 of the strand guide 3 can be continuously monitored and, if necessary, **immediately adapted** to the existing conditions, ...". (Emphasis added.)

This clearly indicates that the speed at which the adjustment is to be performed is as great as possible ("immediately adapt") - no calculation of the speed based on any parameters is suggested.

Moreover, the adjusting steps are monitored based the current cylinder pressure of the hydraulic adjusting devices, wherein the monitoring action comprises the step of applying force control instead of position control when a predetermined force threshold value is surpassed and the step of applying position control again when the target position has been reached.

According to the invention, the current cylinder pressure of the hydraulic devices is compared to a threshold value, and when the threshold value is surpassed, the process control is switched from position control to force control and when the correct value has been reached again, the process control switches back to position control. In this way the billet is protected from pressure loads that are too great.

As described in the instant specification (compare, for example, page 14, line 15, to page 16, line 17), the invention provides an effective force monitoring action and control of the adjusting process via the current cylinder pressures of the hydraulic adjusting devices. Should the force surpass a calculated threshold value or limit, the method switches from position control to force control in order to take the force down to acceptable limits. After reaching the target position, the

method switches back to position control. Proper support for the billet is provided in all phases by switching from position control to force control and vice versa, as needed. An effective force monitoring action, calculated by means of the current cylinder pressures of hydraulic adjusting devices, permanently controls the adjusting process.

Such a dual control action which switches back and forth between force control and position control is not disclosed in the prior art references. The cited prior art to Hohenbichler discloses the adjustment of the support segments 4, 5 relative to one another by means of a control as a function of the gap between the opposed rollers 8 (col. 6, lines 4-8) measured by the measuring devices 13 and, if desired, depending on the casting speed (see col. 6, lines 55-65). The cited prior art reference is however silent in regard to controlling the process or the adjusting steps by means of a combination of force control and position control. There is no mention of a force control being employed. The monitoring action is based only on measuring the spacing between the rollers 8 by the measuring devices 13 - this constitutes position control. The force acting on the billet is not taken into consideration. Likewise, the prior art reference

to Mörwald et al. only deals with position control (position sensors 16) and cannot provide any teaching in regard to force control.

Claim 1 with its dependent claims is therefore believed to be allowable.

Reconsideration and withdrawal of the rejection of claims 10 and 11 under 35 U.S.C. 102(b) as being anticipated by Hohenbichler et al. (US 5,577,548) is respectfully requested.

As discussed, the prior art to Hohenbichler does not consider force control in combination with position control. For this reason there are also no means for position control and force control. Claims 10 and 11 therefore cannot be anticipated by or obvious in view of Hohenbichler.

Therefore, in view of the foregoing, it is submitted that this application is now in condition for allowance and such allowance is respectfully solicited.

Any additional fees or charges required at this time in connection with the application may be charged to Patent and Trademark Office Deposit Account No. 11-1835.

Respectfully submitted,

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Dated: June 4, 2002
Encl.: Twice amended claim 1 (clean copy; marked-up version)

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231, on June 4, 2002

By: _____
Friedrich Kueffner

Date: June 4, 2002

Marked-up Claim Version of Claim 1 to Show Changes Made

1. (Twice Amended) A method for changing the section of a billet of a continuous casting plant during continuous casting, wherein opposed sides of the billet are in contact with oppositely positioned roll supports arranged below a continuous casting die, wherein the roll supports are comprised of segments having rolls, wherein adjoining ones of the segments of each roll support are connected to one another by a jointed connection and wherein each segment is configured to be adjustable independent of the other segments with respect to an angular position relative to the billet, and wherein in an initial position of the segments of the roll supports are adjusted to a uniform billet section; the method comprising the step of:

advancing sequentially in a direction of continuous casting the segments toward the billet by moving the jointed connections toward the billet in a controlled sequence of adjusting steps for reducing the section of the billet; or

moving sequentially in a direction of continuous casting the segments away from the billet by moving the jointed connections away from the billet in a controlled sequence of adjusting steps for increasing the section of the billet;

for reducing the section of the billet with a constant casting speed and with the solidification point of the billet

having passed the first and second segments, advancing an exit side of the first segment and an inlet side of the second segment in the casting direction in a first one of the adjusting steps toward the billet by moving the first and second segments at the jointed connection connecting the first and second segments toward the billet by set-point control, and after the first and second segments have reached a target position, advancing an exit side of the second segment and an inlet side of the third segment in the casting direction in a second one of the adjusting steps toward the billet by moving the second and third segments at the jointed connection connecting the second and third segments toward the billet, and after the second and third segments have reached a target position, advancing in further ones of the adjusting steps the third and further segments toward the billet sequentially in the same manner until all segments have reached the target position;

for increasing the section of the billet with a constant casting speed and with the solidification point of the billet having passed the first and second segments, moving the exit side of the first segment and the inlet side of the second segment in the casting direction away from the billet in a first one of the adjusting steps by moving the first and second segments at the jointed connection connecting the first and second segments away from the billet by set-point control, and,

after the first and second segments have reached a target position, moving the exit side of the second segment and the inlet side of the third segment in the casting direction away from the billet in a second one of the adjusting steps by moving the second and third segments at the jointed connection connecting the second and third segments away from the billet, and, after the second and third segments have reached a target position, moving in further ones of the adjusting steps the third and further segments and so forth away from the billet sequentially in the same manner until all segments have reached the target position;

adjusting the segments at a constant adjusting speed with dynamic position control, wherein a predetermined force threshold value is not surpassed;

calculating an adjusting speed of the segments for advancing or moving away the segments based on permissible billet elongation limit, the current casting speed, the current section adjustment, and the resulting volume flow of the billet;

wherein the adjusting speed is calculated, based on the current casting speed, the segment length, and the required adjusting stroke of the segments, by the equation

$$V = Ds/Ls * Vcast$$

wherein Ds is the section change, Ls is the segment length, and Vcast is the current casting speed;

wherein the adjusting steps are carried out by hydraulic adjusting devices; and

monitoring the adjusting steps via current cylinder pressure of the hydraulic adjusting devices, comprising the step of applying force control instead of position control when a predetermined force threshold value is surpassed and the step of applying position control again when the target position has been reached.